HITCHCOCK and CHASE[23] have published a manual of all the known grasses of the West Indian Islands. The term "West Indies" is defined as including Bermuda, the Bahamas, Trinidad, and Tobago, but excludes the Dutch Islands off the coast of Venezuela. The publication contains descriptions of 455 species, representing 110 genera, including 17 new species and a new genus (*Saugetia*) related to *Gymnopogon*.

STEPHANI[24] has issued the fifth volume of his *Species Hepaticarum*, which deals with the Acrogynae, along with title page and index. He describes 296 species, chiefly established by himself, representing 16 genera, 9 of the species being new. The large genera are *Aneura* (113 spp.) and *Anthoceros* (64 spp.).

WERNHAM,[25] in continuation of his studies of tropical American Rubiaceae, has described 7 new species of *Psychotria*. The same author[26] has described 10 new species of *Palicourea* and 2 new species of *Cephaëlis* from tropical America, chiefly Colombia.—J. M. C.

Sap concentration and plant communities.—Having developed a method of determining the osmotic pressure of cell sap by a depression of the freezing point, HARRIS[27] has proceeded to investigate the tissue fluids of plants typical of the deserts of Jamaica[28] and Arizona,[29] of the mesophytic vegetation of temperate regions, and of the rain forests of Jamaica.[30] Aside from an interesting mass of data regarding the peculiarities of the cell sap of individual species, two generalizations stand out as important contributions to ecological science. They are to the effect that (1) there is a direct relationship between growth forms and sap concentration, as shown in the higher osmotic concentration of

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[23] HITCHCOCK, A. S., and CHASE, AGNES, Grasses of the West Indies. Contrib. U.S. Nat. Herb. **18**:261–471. 1917.

[24] STEPHANI, F., *Species Hepaticarum*. Vol. V. Acrogynae (pars quarta). Geneva. 1916.

[25] WERNHAM, H. F., Tropical American Rubiaceae. IX. Jour. Botany **55**:251–254. 1917.

[26] ———, Tropical American Rubiaceae. IX. Jour. Botany **55**:279–285. 1917.

[27] GORTNER, R. A., and HARRIS, J. ARTHUR, Notes on the technique of the determination of the freezing point of vegetable saps. Plant World **17**:49–53. 1914.

[28] HARRIS, J. ARTHUR, and LAWRENCE, J. V., Cryoscopic determinations on the tissue fluids of the plants of the Jamaican coastal deserts. BOT. GAZ. **64**:285–305. 1917.

[29] HARRIS, J. ARTHUR, et al., On the osmotic pressure of the juices of desert plants. Science N.S. **41**:656–658. 1915.

HARRIS, J. ARTHUR, and LAWRENCE, J. V., The cryoscopic constants of expressed vegetable saps as related to local conditions in the Arizona deserts. Physiol. Researches **2**:1–49. 1916.

[30] HARRIS, J. ARTHUR, and LAWRENCE, J. V., The osmotic concentration of the tissue fluids of Jamaican montane rain forest vegetation. Amer. Jour. Bot. **4**:268–298. 1917.

the fluids from the leaves of woody as compared with those from herbaceous plants, and (2) that the sap concentration shows a variation corresponding to the xerophytism of the plant community from which the fluids are obtained.

The importance of the latter relationship has been given emphasis in a paper which gives a summary of results concerning large and widely differing plant formations.[31] Here it is seen that the concentration of the cell sap of the woody plants varies from 11.44 atmospheres for that from the rain forest and 14.4 for that from mesophytic habitats to 24.97–30.05 atmospheres for the fluids of desert plants. Herbaceous plants from these same habitats show sap concentration values of 8.80, 10.41, and 15.15 atmospheres respectively. As might be expected, succulent halophytes show even higher concentrations, culminating, perhaps, in 49.7 atmospheres for *Batis maritima*. Curiously enough, the epiphytes of the rain forest show concentrations of a low order, such as 3.34–4.88 atmospheres for the epiphytic Orchidaceae from Jamaica and Florida.

These and other similar results are sufficient to demonstrate that in this line of investigation there has been found a means of expressing in a quantitative manner the sap properties of both large and small plant communities; hence not only must the results themselves be regarded as important, but a much higher value must be placed upon the introduction of a method which will tend to exactness in studies of the physiological plant geography.—GEO. D. FULLER.

Natal vegetation.—In advancing our acquaintance with the vegetation of South Africa, BEWS[32] has made a study of the species native to Natal according to RAUNKIAER'S life-forms, and has expressed the results in a biological spectrum for that part of South Africa. Some of the conspicuous features of the vegetation as shown by this analysis are the richness, manifest in more than 3000 species, and the small number of large phanerophytes which is far below the average in contrast with the abundance of lianas, chamaephytes, and geophytes. One of the interesting incidental features of the vegetation consists in the presence of stem succulents, all possessing a milky juice, as they belong to the *Asclepiadaceae* and *Euphorbiaceae*.

In a more recent paper, the same writer[33] has described the vegetation of the mountains forming the western boundary of Natal and reaching an altitude of 3400 m. The outline of the plant communities involved shows that grassland and scrub associations predominate. Of the latter, the one developed

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[31] HARRIS, J. ARTHUR, Physical chemistry in the service of phytogeography. Science N.S. **46**:25–30. 1917.

[32] BEWS, J. W., The growth forms of Natal plants. Trans. Roy. Soc. S. Africa **5**:605–636. 1916.

[33] ———, The plant ecology of the Drakensberg range. Annals Natal Museum **3**:511–565. 1917.